

Appl. No. 09/682,636  
Amdt. Dated April 16, 2003  
Reply to Office action of February 4, 2003

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

Claim 1. (original) A radiation detector, comprising:

a scintillator which produces UV photons in response to receiving radiation from a radiation producing source; and

a wide bandgap semiconductor device sensitive to the UV photons produced by the scintillator, said semiconductor device producing an electric signal as a function of the amount of UV photons incident thereon.

Claim 2. (original) The radiation detector as set forth in claim 1, wherein the wide bandgap semiconductor device is a SiC, GaN or AlGaIn device.

Claim 3. (original) The radiation detector as set forth in claim 2, wherein the semiconductor device is a photodiode or an avalanche photodiode.

Claim 4. (original) The radiation detector as set forth in claim 3, wherein the semiconductor device is an array of photodiodes or avalanche photodiodes.

Claim 5. (original) The radiation detector as set forth in claim 1, wherein the wide bandgap semiconductor device has a dark current less than or equal to about 1.0 pA/cm<sup>2</sup> at about 0.5 VR.

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Claim 6. (original) The radiation detector as set forth in claim 1, wherein the wide bandgap semiconductor device includes a bandgap greater than or equal to about 2 eV.

Claim 7. (original) The radiation detector as set forth in claim 1, wherein the wide bandgap semiconductor device includes a bandgap equal to about 3 eV.

Claim 8. (original) The radiation detector as set forth in claim 1, wherein an output of the UV photons from the scintillator substantially matches a responsivity of the wide bandgap semiconductor device.

Claim 9. (currently amended) The radiation detector as set forth in claim 1, wherein the scintillator includes LiHfO<sub>3</sub>, BaF<sub>2</sub>, CsI, CeF<sub>3</sub>, LuAlO<sub>3</sub>:Ce, or LuAlO<sub>3</sub>:Pr U<sub>2</sub>HfO<sub>3</sub>, BaF<sub>2</sub>, CsI, CeF<sub>3</sub>, LuAlO<sub>3</sub>:Ce<sup>3+</sup>, or Lu<sub>3</sub>Al<sub>5</sub>O<sub>12</sub>:Pr<sup>3+</sup>.

Claim 10. (original) The radiation detector as set forth in claim 1, wherein the radiation includes at least one of gamma rays and x - rays.

Claim 11. (original) A method of detecting radiation, comprising:

receiving radiation from a source;

producing UV photons in response to the received radiation;

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directing the UV photons to a wide bandgap semiconductor device which is sensitive to the UV photons; and

generating an electric signal with the wide bandgap semiconductor device, said signal being a function of the amount of UV photons incident on the semiconductor device.

Claim 12. (original) The method of detecting radiation as set forth in claim 11, further including:

limiting a dark current of the wide bandgap semiconductor device to be less than or equal to about  $1.0 \text{ pA/cm}^2$  at about 0.5 VR.

Claim 13. (original) The method of detecting radiation as set forth in claim 11, wherein a bandgap of the wide bandgap semiconductor device is greater than or equal to about 2 eV.

Claim 14. (original) The method of detecting radiation as set forth in claim 11, wherein a bandgap of the wide bandgap semiconductor device is greater than or equal to about 3 eV.

Claim 15. (original) The method of detecting radiation as set forth in claim 11, further including:

substantially matching an output of the UV photons to a responsivity of the wide bandgap semiconductor device.

Claim 16. (original) The method of detecting radiation as set forth in claim 11, wherein the wide bandgap semiconductor device includes SiC, GaN or AlGaIn.

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Claim 17. (currently amended) The method of detecting radiation as set forth in claim 11, wherein the UV photons are produced by a scintillator that has the received radiation incident thereon, said scintillator including ~~LiHfO<sub>3</sub>, BaF<sub>2</sub>, CsI, CeF<sub>3</sub>, LuAlO<sub>3</sub>:Ce, or LuAlO<sub>3</sub>:Pr~~ Li<sub>2</sub>HfO<sub>3</sub>, BaF<sub>2</sub>, CsI, CeF<sub>3</sub>, LuAlO<sub>3</sub>:Ce<sup>3+</sup>, or Lu<sub>3</sub>Al<sub>5</sub>O<sub>12</sub>:Pr<sup>3+</sup>.

Claim 18. (currently amended) A system for measuring radiation, comprising:

means for producing a number of UV photons in response to received radiation, said number of UV photons being proportional to a level of the radiation; and

~~means~~ wide bandgap semiconductor means for producing an electric signal as a function of the number of the UV photons.

Claim 19. (original) The system for measuring radiation as set forth in claim 18, wherein the received radiation is gamma rays or x-rays.

Claim 20. (canceled).

Claim 21. (currently amended) The system for measuring radiation as set forth in claim 18, wherein the means for producing the number of UV photons includes a scintillator, said scintillator including ~~LiHfO<sub>3</sub>, BaF<sub>2</sub>, CsI, CeF<sub>3</sub>, LuAlO<sub>3</sub>:Ce, or LuAlO<sub>3</sub>:Pr~~ Li<sub>2</sub>HfO<sub>3</sub>, BaF<sub>2</sub>, CsI, CeF<sub>3</sub>, LuAlO<sub>3</sub>:Ce<sup>3+</sup>, or Lu<sub>3</sub>Al<sub>5</sub>O<sub>12</sub>:Pr<sup>3+</sup>.

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Claim 22. (original) The system for measuring radiation as set forth in claim 21, the system further including:

a reflector, said reflector focusing the UV photons from the scintillator onto the means for producing the electric signal.

Claim 23. (currently amended) The system for measuring radiation as set forth in claim 18, wherein the system is incorporated into ~~one of a medical imaging apparatus or an oil exploration drilling apparatus~~, for monitoring a subject, the system further comprising:

means for generating radiation; and

means for producing a number of UV photons in response to received radiation and wide bandgap semiconductor means, paired between partitioning means, said at least one pair configured to receive radiation from the subject.

Claim 24. (new) The system for measuring radiation as set forth in claim 18, wherein the system is incorporated into an oil exploration drilling apparatus.